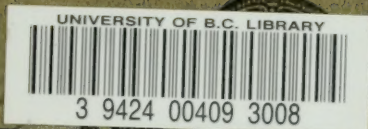


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AGRICULTURAL ECONOMICS IN THE EMPIRE

REPORT OF A COMMITTEE APPOINTED
BY THE EMPIRE MARKETING BOARD



OCTOBER, 1927

LONDON:

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EMPIRE MARKETING BOARD

COMMITTEE ON AGRICULTURAL ECONOMICS

Report to the Empire Marketing Board

I.—INTRODUCTION.

ON July 11th, 1927, the Empire Marketing Board summoned an informal conference to discuss the present position of research in agricultural economics in the Empire. At this meeting two questions were discussed :—

- (1) Whether there was need for further research in agricultural economics, and, if so, along what lines ; and
- (2) The practicability of pursuing certain recommendations of the International Economic Conference in regard to agricultural economics.

The Chairman, Major W. Elliot, M.C., M.P., pointed out that the Empire Marketing Board had received applications from the Institute of Agricultural Economics at Oxford and from the Government of Northern Ireland for grants to carry out research into certain aspects of agricultural economics. It had also made grants to the English Ministry of Agriculture for research into marketing problems. The Board therefore desired to have some guidance as to the scope of research in agricultural economics, the difficulties which hamper development, and the best means of advancing the study of the subject in the interests of Empire agriculture.

After a general interchange of views it was agreed that a small Committee should be appointed to prepare a Report, which might serve as a basis for discussion at the Imperial Agricultural Research Conference. This Committee consisted of :—

Mr. F. L. McDougall, C.M.G.	Representative of Australia on the Empire Marketing Board.
(Chairman)	
Mr. H. A. F. Lindsay, C.I.E., C.B.E., I.C.S.	Representative of India on the Empire Marketing Board.
Mr. C. S. Orwin	Agricultural Economics Research Institute, Oxford.
Mr. J. A. Venn	Department of Agriculture, Cambridge University.
Mr. R. R. Enfield	Ministry of Agriculture and Fisheries.
Mr. J. B. Guild, M.B.E. ..	National Farmers' Union.
Mr. E. M. H. Lloyd	Empire Marketing Board.
Mr. G. M. Dykes	Secretary.

The Committee secured the services of Mr. J. P. Maxton, of the Agricultural Economics Research Institute, Oxford, for the purpose of drafting their Report.

The Committee held three meetings, and decided that, in the limited time available, it was not possible to do more than indicate the scope of some of the more important branches of agricultural economics. References are given in the Report to the organised research work that has been undertaken in various parts of the Empire, but no attempt has been made to give a complete account of the work of individual investigators or of special enquiries. A comprehensive survey of this kind must be deferred to a later date and is, indeed, one of the first steps which the Committee recommends as a means of advancing the study of the subject.

It is clear from the interchange of views which has taken place, both at the preliminary conference and at meetings of the Committee, that the study of agricultural economics in the Empire is still relatively undeveloped. At the same time there is a growing appreciation, both at home and overseas, of the great potential advantages to Empire agriculture which may be expected to result from the development of research along sound lines. The Committee feel that agricultural economics should be recognised as an essential part of agricultural research, and they welcome the inclusion of this subject among the topics to be discussed at the Imperial Agricultural Research Conference.

The plan of the Report is as follows :—

After a brief sketch in Section II of the agricultural economic laboratories which have been established in Empire countries, the relation of agricultural economists to public statistics is discussed in Section III. The project of the World Census in 1930 by the International Institute of Agriculture is also referred to in this Section. The importance of agricultural geography as a background in the study of agricultural economics is the subject of Section IV. Farm management and the special methods of studying its problems are outlined in Section V. The opportunities for a thorough examination of the economics of the marketing of farm products is referred to in Section VI. Section VII gives a brief reference to co-operation, and Section VIII deals in a summary way with the study of the agricultural significance of certain general social and economic structures like transport, land tenure, etc. Section IX discusses the application of the results of agricultural economic research to the improvement of farming conditions.

To facilitate discussion, a brief summary of the Report and recommendations is given at the end of the Report.

II.—DESCRIPTIVE.

A COMPLETELY comprehensive outline of the field of agricultural economic research must cover a very wide range. Geographically, agriculture is world-wide and as an industry it is dependent upon all other industries for its prosperity. Much, therefore, of the progress which may be achieved by economic science in agriculture must be international in its character, while much of it must involve study of industrial conditions which are very remote from the farm.

Starting from the comparatively constant features of land tenure, climate and other geographical conditions and the general organisation of farms, the track of agricultural economic research leads through the first operations in the production of farm commodities right to the passing of the commodities into the hands of the consumer, whose circumstances and tastes, in turn, cannot be ignored as factors directing production. It is the charting of this track and the provision of posts and warnings and even the removal of twists and bends and dangerous crossings, that is the work of agricultural economic research.

Farmers operate in comparatively small units over a widely scattered area and under varied natural conditions. Similarly, their markets are often scattered and remote. It is difficult for them to study for themselves the economic organisation of their industry. If the study has to be made, either in the farmers' or in the public interest, it must be done from public funds.

Until quite recently in Empire countries there were three main types of enquiry by which farmers' conditions were reviewed: (1) by individual observers, (2) by Government Commissions or Committees of Enquiry, and (3) by the incidental work of research workers in the field of applied natural sciences. The objections to all three methods are now apparent. The conditions are too diverse for the unsupported observation of individuals to be sufficiently reliable or representative. The Government Commission method, while it has advantages of its own, only emphasises certain factors at the time of enquiry, a time which is usually abnormal else there would probably be no enquiry. It necessarily has to ignore to some extent the normal routine of the industry. Much valuable work has been done by the third method, but it is becoming more and more clear that economic research has to have a technique of its own and that its observations have got to be continuous to make them of value.

The appreciation of this need has been shown by the rapid growth in the last decade of agricultural economic research stations. These research stations are for the most part connected with Universities, Agricultural Colleges, Experimental Stations and Government Departments. To avoid any confusion as to the type of institution referred to, the phrase "economic laboratory" may be coined to refer to any body organised for the purpose of following out a plan of research in agricultural economics.

The documents on Agriculture presented to the League of Nations Economic Conference indicate the value which is being placed upon reliable economic data concerning agriculture throughout the world, and the International Institute of Agriculture at Rome has for many years endeavoured to review the economic aspects as well as the scientific progress of the world's agriculture.

Among nations, it is undeniable that the United States of America have advanced further in research in agricultural economics than any other country. The United States have almost a quarter of a century's experience in agricultural economic research, whereas, as a special study, research of the kind is a post-war development in most of the Empire countries. The U.S. Bureau of Agricultural Economics was founded in 1922. In the year 1925-26 it had an appropriation of about £950,000 (\$4,747,719). The results of the expenditure of so very large a sum of money deserve

attention, especially when it is remembered that that is the Federal organisation alone. Each State Agricultural College and Experimental Station spends, in addition, considerable sums of money upon agricultural economic research, and there is a growing co-operation between the work of the State College departments and the Federal Bureau.

Important work in agricultural economic research has also been undertaken for many years in Continental countries, notably in Denmark, Switzerland and Germany.

The organisation and progress of agricultural economic research in the United Kingdom is described in some detail in "Research and the Land" by V. E. Wilkins, issued by the Ministry of Agriculture¹. The Agricultural Economics Research Institute was established at Oxford in 1913 and carried on with a small staff until recent years. Since the war the staff has been strengthened and the work extended in several new directions. In addition to the extended work at Oxford, advisory agricultural economists have been appointed under the Ministry of Agriculture's scheme to Cambridge, Leeds, Aberystwyth, Reading, Manchester and Bristol Universities, and to Armstrong College, Newcastle; Harper-Adams Agricultural College, Newport, Salop; Midland Agricultural College, Sutton Bonnington; South-Eastern Agricultural College, Wye, Kent; and Seale-Hayne Agricultural College, Devon. Cambridge, Leeds and Aberystwyth have already made considerable progress in research work in their provinces and in conjunction with Oxford. A Marketing and Co-operation Branch of the Ministry of Agriculture has been established to conduct investigations into these subjects. The Ministry of Agriculture for Northern Ireland is also interesting itself in economic research, and the Board of Agriculture for Scotland have recently appointed an agricultural economist to their staff to organise extensive research on those lines. Agricultural economics in recent years has been included in the courses in most Agricultural Colleges and has become in some Universities a subject in which undergraduates may specialise for their degrees in agriculture. Both the Ministry of Agriculture for England and Wales and the Board of Agriculture for Scotland now provide post-graduate research scholarships in agricultural economics. It is noteworthy, however, that there is no Chair of Agricultural Economics in any University in Great Britain.

Interest was stimulated in agricultural economics in Canada more than a decade ago, but only in one province, namely, Ontario, has organised research been developed to any extent. In the other provinces, agricultural economics has attained an important place in the agricultural education system. The proximity of famous American departments of agricultural economics like Cornell, Wisconsin and Minnesota gave opportunities of training men for educational work. Within the last two or three years, professors of agricultural economics have been appointed in the two French Colleges in Quebec, St. Anne de la Pocatière and Oka, and in the University of Saskatchewan. Courses of lectures are given in all the other colleges, although no special lectureship exists. The University of British Columbia has conducted intermittent research into economic aspects of poultry, dairy produce and fruit.

The work of the Farm Economics Department of the Ontario Agricultural College, Guelph, however, has proceeded uninterrupted for a decade. Surveys of various types of farming in Ontario, as well as investigations into marketing of

butter, cheese and tobacco have been published. In addition, cost accounts on representative farms were kept for a period of five years and are now being analysed.

The Dominion Government of Canada, through their experimental stations, have carried out a certain amount of economic research, but no organised department of agricultural economics has been formed.

As in other countries, much economic investigation of an unorganised kind have been conducted for some years in South Africa. A step forward was taken early in 1925, when the Division of Agricultural Economics, Marketing and Co-operation² was formed. Some of the activities of the new organisation were taken over from older departments. In addition to its statistical work and its service work in connection with co-operative societies, an extended programme of research has been planned, some of the results of which will shortly be published. The work, it appears, is intended to be centralised, no arrangement being made for working in conjunction with agricultural colleges or experimental stations.

Another newcomer to the field of economic research is New Zealand, which, in the beginning of 1926, founded a branch of Farm Economics in connection with the Fields Division of the Department of Agriculture³. By the end of 1926 it was reported that three investigations were already under way, a survey of mixed farming in Canterbury, a combined investigation into the production of wool and meat, and an investigation into the cost of producing butter-fat.

Ireland came under the British Agricultural Costings Scheme after the war. The British scheme was officially abandoned by the change of policy in 1921, and the keeping of records ceased in Ireland, although analysis of records already collected was undertaken. Some of the results were published in 1922 and in 1925⁴. In 1924, the Department of Lands and Agriculture developed a scheme of enquiry which has been continued since.

The Australian Governments and Colleges have not yet taken any definite step into this field of research. The Turretfield Demonstration Farm of the Department of Agriculture of South Australia has been managed on strictly business lines since 1921, and complete detailed cost accounts have been kept during that time. An analysis of the costs is to be found in the *Journal of Agriculture of South Australia*, Vol. XXX, No. 3, October 15th, 1926⁵. As far back as 1916, a cost of production study of the growing of wheat was conducted by the Victorian Department of Agriculture on an experimental area. No department has yet been organised, however, for the specific purpose of research in agricultural economics, but the recently-established Development and Migration Commission is likely to stimulate organised research in this field. It has already initiated an economic survey of the resources of Tasmania.

The agricultural conditions of India differ so radically from the Empire countries already mentioned that it is not to be expected that research in economics should develop on parallel lines. No organised institutions have been set up, but the recent evidence given to the Royal Commission on Indian Agriculture reveals an interest in agricultural economics. In view of the contrast of conditions, however, the projected scheme of extending economic surveys of villages, which was the main object of an enquiry by the Indian Economic Enquiry Committee in 1925, is of interest.

It is hardly to be expected that organised economic research work can be developed in the Crown Colonies. It is to be noted, however, that for the past two years the Colonial Office scheme for the training of men for service as agricultural officers in the Crown Colonies has included a year's instruction at the Agricultural Economics Research Institute at Oxford, and agricultural economics is included also in their course of study at the Imperial College of Tropical Agriculture, Trinidad.

III.—STATISTICS.

THE method of agricultural economics is to combine accurate, intensive observation with analysis and interpretation of statistics. The statistics used in agricultural economics fall into two classes, namely, (1) those which are collected for specific purposes, as by cost accounting or by surveys, and (2) those which are collected and published regularly by public authorities for general purposes, as, for example, the Agricultural Statistics in Great Britain and other countries, population statistics, imports, prices and so on. General statistics of this kind are sometimes published also by private agencies, as, for example, the price indices of the *Statist*, *Bradstreet*, and the *Economist*.

The former class of statistics will be referred to later. The class of public and general statistics requires some reference here before proceeding to discuss the divisions of production, marketing and general problems, since these statistics are a foundation for the investigation of all economic problems.

The work of the statistician is not identical with the economist's. The economist begins, in a sense, where the statistician leaves off. Few economists find statistics exactly in the form or with the amount of detail they wish. Economic research is progressive—or, at least, it changes whether progressively or not. On the other hand, there are three strongly conservative influences weighing upon the statistician. The chief of these is, as always, expense, but a further influence lies in the fact that public statistics are issued for general use, and not to satisfy the special requirements of individual investigators. They must, therefore, be issued in a form which is likely to be most generally useful. A third influence in favour of the *status quo* is that statistics are used probably most frequently for comparison of one year with another, often over a long period. It is essential, therefore, that the form and classification of items should be retained with as much continuity as possible.

Development is necessary, however, and in order to reconcile the perhaps unreasonable demands of all kinds of economic enquirers with the conservative influences outlined, there is reason for advocating that development should be the result of joint discussion between statisticians and economists. There is no reason why the discussion should be confined to agricultural statistics. Agricultural economists make frequent use of other statistics, namely, of population, weather, trade, etc.

One particular development of statistics in which frequent discussion between statisticians and economists is necessary is the preparation of index numbers of prices. The preparation of these often requires intimate knowledge of economic conditions,

and even when the shrewdest judgment has been brought to bear there is frequent ground for controversy. There is need, therefore, for something in the nature of "agreed" indices.

World Agricultural Census.

The collaboration which has been suggested between statisticians and economists in guiding the policy of agricultural statistics finds a parallel in the proposed collaboration between statisticians of all countries in the World Agricultural Census of 1930. The project has two main objects: (1) to obtain statistics of agricultural production in countries where hitherto no statistics have been available, and (2) to obtain uniformity and comparability between the statistics of countries which already have a system of collection.

In many countries a system of collection of agricultural statistics has been in operation so long that the existence of the statistics has become a matter of course and their importance, to some extent, underestimated. It may surprise many to learn on the authority of the International Institute of Agriculture⁶ that, "of a total of nearly 200 countries (including colonies), only 37 have taken agricultural census in the first 25 years of the present century. The area of these countries represents a little less than half the land area and about 30 per cent. of the population of the world. The remaining 160 countries that represent a little more than 70 per cent. of the total population of the world have never taken an agricultural census, or at least not within the last twenty years." The expression "Census" refers, of course, to a complete enumeration. Some, at least, of the countries referred to issue annual estimates of acreage under crops, etc.

Much of the statistically undeveloped territory lies within the Colonial Empire. It is of importance not only to the particular colony, but also to the Empire as a whole, that this deficiency should be remedied. If one or two producing countries have no reliable statistics, there is obviously a large element of uncertainty in estimating the world production of any product. The attention of the Governments of the Empire might, therefore, be drawn to the need for co-operating to the fullest extent in the project of a World Agricultural Census in 1930.

IV.—AGRICULTURAL GEOGRAPHY.

AGRICULTURE is governed by many forces, but the most vital influences outside the economic are the geographical conditions of soil, altitude, climate, and so on. These conditions more than any other have determined the localisation of types of farming throughout each country and throughout the world. The value of being able to visualise the main agricultural producing areas of the world and also, in more detail, the distribution of types of farming in each country in relation to geographical conditions is inestimable. The influence of climate upon crop and fruit growing is, of course, primarily a scientific problem, and the conquering of the restrictions of climate by plant breeding has been demonstrated all over the world by the introduction of drought-resisting and frost-resisting varieties. It is not in any way

under-estimating scientific work of this kind to emphasise the need for development in the economic geography of agriculture.

From the point of view of the study of markets, it is useful to have this knowledge of agricultural geography. In the world aspect, in the first place, it shows in a graphic form the primary sources of supply of commodities. In the second place, it gives an idea of the comparative geographical advantages or disadvantages of one producing area with another and, thirdly, it shows the restrictions on or possibilities of expansion of the producing areas. The last point may be illustrated simply. Everyone knows that Australia and Argentina are large wheat-producing countries. It is also a matter of general knowledge that both countries are capable of great development and the limiting factor at present is chiefly the need of settlers. What, however, are the probable geographical limits of expansion of the wheat areas of these countries, assuming that settlement took place rapidly?

From the point of view of production, the national value of agricultural geography is more pronounced. The distribution of types of farming into areas has been determined largely by geographical conditions together with some traditional influences. Economic factors over which individual farmers have no control work slow but undoubted changes in local systems of farming. In any readjustments, therefore, which must take place in the traditional systems of farming to meet changed economic conditions, geographical conditions bulk very largely, and a knowledge of these will materially assist in the framing of policies of readjustment.

Very little deliberate progress has been made with this phase of agricultural economics. The Agricultural Atlas of England and Wales prepared at the Agricultural Economics Research Institute at Oxford by J. Pryse Howell⁷, and the work in U.S.A. of O. E. Baker and V. C. Finch, "Geography of the World's Agriculture,"⁸ have proved their usefulness.

V.—FARM MANAGEMENT.

WITHIN the sphere of agricultural economics, farm management is the central point of the study of production. Farming in most countries (excluding from consideration native agriculture) now produces primarily for sale and not for home use. In all cases capital is invested, and labour, either family or hired, has to be utilised. These factors require organisation just as in any other business, and it is to the end of organising the factors in the most economical way that farm management research is conducted.

There are three principal means by which agricultural economic laboratories can advise the farmer in the organisation of his farm. First, they can put within his reach knowledge of economic conditions in other producing areas, in markets, and so on. In other words, they aim to be in a position to focus upon the individual farm and its problems the wide general knowledge of agricultural economics. The second way is by analysing in detail the organisation of the individual farm in order to bring out opportunities of economising materials and effort. By the third way the economic laboratories are able, by examining (less minutely than by the second way) a large

number of farms of a similar type, to isolate certain features which seem to be associated with success or with failure, and to show how these may be developed or modified on individual farms of the same type.

The first of these three ways needs no elaboration at this point. The second and third represent the two methods which are used by economic laboratories of analysing farms and farming systems. The two methods are cost accounting and the survey.

In addition to the immediate value of these methods in enabling advice to be given to individual farmers, general economic principles governing the industry are being uncovered and a groundwork is being laid upon which policies—governmental or co-operative—may be built.

Cost Accounting.

The cost accounting method is, as it were, the microscopic method. Most farms are a combination of different enterprises (corn-growing, cattle-feeding, poultry, and so on) which are interdependent. Cost accounting seeks to define where the enterprises combine profitably and where they do not. It studies in detail the application of the factors of production, labour and capital, to the land. It hopes to detect and suggest remedies for inefficient management of man labour, horse labour, machinery, power, feeding stuffs, manures, and so on; to make reliable comparative cost tests of new machinery and new methods; to check, in short, in the management of land, labour, live-stock and machinery, economies which are often not sufficiently apparent to be noticed by the unassisted observation of the farmer.

Systems of cost accounting differ. The system pioneered by Oxford since 1913⁹ has been adopted in general principles by the advisory provinces in England. The measure of agreement was reached and is maintained by periodic conferences at which points of difference are discussed. The systems adopted by continental countries and the United States of America are at variance on several important points with the English system.

Briefly outlined, the general plan, however, of cost accounting consists of the farmer keeping certain records throughout the year. The inventory and valuation record is made up annually. The labour time sheets record the hourly distribution of the work of each man and horse employed. The labour analysis sheet is made up weekly from the time sheets. The live-stock record is made up weekly and entries are made in the receipts and payments record as they occur. The keeping of these records punctually is the farmer's part in the costings method. The records are collected from the farm to the research department and the office work is done there.

The office routine consists of opening a double-entry system of accounts for each department of the farm. At the end of the financial year the accounts are closed. A balance sheet and a statement of the accounts for the year are prepared.

The first result is to show profit or loss on the year's work of the whole farm; the next result is to show the itemised expenses of and receipts from each of the products of the farm, sheep, cattle, wheat, oats, potatoes, etc. Other results are to show the costs of man and horse labour, of machinery, of home-grown and

purchased foods, etc., to show the use of man and horse labour throughout the year, and the amount and value of produce derived by the farm household from the farm. There is almost an infinity of minor problems which cost accounting is sometimes able at least to enunciate for the individual farm.

Interesting complete records of the operations of farm costs have been published in Great Britain¹⁰. The published records are, however, only a part of the work done, a very large number of records being filed in Oxford and elsewhere.

The Department of Farm Economics of the Ontario Agricultural College, Guelph, Ontario, Canada, conducted, as already mentioned, a costings scheme over a large number of farms of various types in the Province of Ontario. It is on this aspect of agricultural economics that the Irish Free State Department of Farm Economics have so far concentrated. Their work has been referred to already. The results of the extended work since 1924 are now being compiled. The recently-established branch of Farm Economics of the New Zealand Department of Agriculture have undertaken a scheme of costings in each district as a part of their work. It is probable, too, that the Scottish Board of Agriculture will shortly organise work along similar lines to the English Costings Scheme.

A restricted form of cost accounting consists of ascertaining the cost of producing one or other of the farm commodities, such as milk, wheat, sugar beet. A general statement is made of the farm business as a whole, and detailed cost records are kept for the single commodity which is being investigated. Several investigations of this kind are being conducted in England: at Oxford (in association with other centres) into sugar beet¹¹; at Aberystwyth, Leeds and Wye into milk. Some results of these have already been published.

Survey Method.

In the initial stages of agricultural economics in the United States and in Great Britain, attention was concentrated upon the cost-accounting method. It was natural to expect that the most detailed form of study would yield the best results. It has become apparent, however, that more was being expected from the method than under existing conditions it was capable of producing. The large amount of office work required puts a very low limit upon the number of farms which can be costed at one time by a research department. As a means, therefore, of discovering average conditions of farming over an area or of isolating the general economic factors of success, the method has serious limitations.

This experience has brought into use another method of obtaining and analysing farm management data, namely, the survey method. The survey method has been used extensively in the United States, where it has completely established its usefulness. A number of investigations covering nearly 1,500 farms have been made in this way by the Oxford Institute in the last five years. The Department of Farm Economics of the Ontario Agricultural College¹² has published the results of surveys of dairy farming, beef-raising, mixed farming, apple-growing and fruit farming in various parts of the Province of Ontario. The Agricultural College of British Columbia for some years conducted surveys of poultry and dairy farming. The Department of Agricultural Economics in South Africa has initiated surveys

into the economic conditions of farms operating under closer settlement conditions and into the citrus and poultry industries. The New Zealand Farm Economics Branch has embarked upon a plan of surveying mixed farming, wool, meat and butter-fat production. Certain single commodity studies have been made by the survey method in England and Wales, *e.g.*, of poultry at Aberystwyth and of celery at the Midlands Agricultural College.

With the survey method the investigator visits as many farms as possible in the area to be surveyed. One visit is usually sufficient. The farmer is asked to give from memory or from any records which he may have kept for his personal use, information regarding the size of farm, the number of acres under each crop grown, pasture and waste land; the yields of the various crops and the amount sold during the year; the amount of "feed" purchased and consumed during the year; the numbers and values of each kind of live-stock at the beginning and end of the year, together with purchases, sales and deaths of animals within the year; receipts from all live-stock products—milk, eggs, wool, etc.; an account of current expenses (taxes, rent, labour, repairs, etc.); a valuation of the capital invested in the farm, with an estimate of the depreciation on machinery, etc.

The analysis of general farm survey records is still in the experimental stage in England. In the surveys by the Ontario Agricultural College the material has been used very fully, so that their method (which is modelled upon American experience) may be briefly outlined.

From the data collected, all farm receipts for the year are totalled; all expenses for the year, including wages, are totalled. The total expenses are deducted from the total receipts and the balance is the net revenue for the year, being interest on capital plus the earnings of the farmer as organiser. Interest upon the capital invested (shown in valuation) is charged at a fixed rate (usually 5 per cent.) and deducted from the net revenue. The amount left is called the farmer's "labour income," being his earnings as an organiser. The labour income may, of course, be positive or negative.

The labour income is then used as the measure of success of the farm business, and the subsequent analysis consists in determining the effect of certain major factors of the farm organisation upon the labour income. The method is to distribute and re-distribute the individual farms into groups according to the major factors which are being studied, *e.g.*, size of farm, comparative standard of crop yields, comparative standard of live-stock output, amount of specialisation in one product, the proportion of current miscellaneous expenses, etc., and to note the influence of these factors upon labour income. Those factors mentioned are the factors common to all farms. The method is, however, extended to factors which are peculiar to special types of farming, *e.g.*, amount of winter milk produced on dairy farms; the intensity of the cows per acre on dairy farms; the proportion of pasture to arable land on beef-raising farms; proportion of crops sold on beef-raising farms.

This method of analysis has shown some very useful results for the education of the individual farmer, and one of its merits is that the individual farmer can be given a statement of the standing of his farm, in respect of these major factors, in relation to

the average of his neighbours. Cost of production figures have also been worked out from the survey records by the Ontario Farm Economics Department.

The objects which it can reasonably be expected will be attained by the method are (according to the statement of the Ontario Farm Economics Department) :—

- (1) To secure reliable information regarding agriculture based on conditions as they exist on the average farm of the various types.
- (2) To determine the factors that have the greatest effect on raising or lowering farm profits by comparing the business organisation of the successful and unsuccessful farms.
- (3) To give suggestions as to the most profitable organisation of the farm business.
- (4) To determine the cost of production of farm products.

Financial Accounts.

The value of the survey method is very much increased where simple financial accounts are kept by the farmer. There are, of course, many other reasons why farmers should be induced to keep simple financial accounts, and in this respect the project which is being attempted, notably in Bristol, of organising farmers' book-keeping societies is valuable. It is a movement which might prove of considerable value in the close-settlement areas of some of the Dominions.

The extent of the farm production problems which may be investigated by these methods has not yet been fully explored. It is not necessary that economic investigation should make the best farmers better. Economic investigation may not be able to teach the best farmers anything as regards farm management. These studies may succeed, however, in raising the average level of farming by enabling the less successful farmers to farm more profitably.

VI.—MARKETING.

THERE are no clearly-defined methods of undertaking marketing research. Each commodity has its own problems and for the most part its own system of marketing, so that the whole field of marketing research has to be surveyed on a commodity basis, with, at the same time, a comprehension of the interaction of one commodity upon another. These facts make it a very extensive and very complex field of investigation.

There is, however, a broad distinction between two main sections of marketing research, namely : (1) research into the mechanism of marketing, and (2) research into the market conditions of supply and demand.

Marketing Mechanism.

Mechanism of marketing refers to the means whereby the produce is moved from the farm to the consumer. A small amount of some products, *e.g.*, milk, is sold direct by farmer to consumer. The biggest part, however, of farm produce (for home use or for export) passes through a great many hands in order to reach its final

market. Most products have alternative channels for all or part of the way to the consumer.

There is no need to illustrate in detail all that is implied in the phrase mechanism of marketing. The chief function of the mechanism is the moving of the product to the consumer, a function which consists of assembling, storage and disposal of the produce and the financing and insurance of the operations. In addition, there are certain services, such as grading and packing and processing, which are performed at various points *en route* to the consumer. These services vary considerably in cost and importance for different commodities, and a study of the mechanism of the marketing of oversea produce requires somewhat different emphasis from that of home produce.

Many economic problems obviously arise from even casual observation of the mechanism of marketing. In the first instance, however, there is a need, in the interests of the farmer, of a comparatively elementary study of the mechanism in order either that he (being somewhat better informed thereby) may individually be able to improve his own method of disposing of his produce or that he may, as a result of the knowledge of the mechanism of marketing, be induced to organise with his neighbours to sell to better advantage.

From the elementary survey the essential economic aspects of the trade in each product are made clear, and more advanced research in these essential aspects may follow, leading to greater efficiency in the marketing system either through private trade, co-operative associations or State marketing.

The study of marketing mechanism was undertaken up till recently by the method of Government Commission or Committee of Enquiry. The main objection to the method is that it takes only one cross-section of a constantly growing thing. The advantage of research by organised economic laboratories is that they can, either by keeping constantly in touch or by means of frequent surveys, follow the changes of mechanism. The reaction of mechanism to conditions is in itself an economic study of importance.

Organised research in marketing has progressed rapidly in recent years, and most of it has been in the nature of studies of the mechanism of marketing. The investigations of the Imperial Economic Committee cover the marketing of Empire produce in the United Kingdom. Research is being conducted in England by the Ministry of Agriculture's Markets and Co-operation Branch and at Oxford¹³ and Aberystwyth. Some of the Ministry's work has dealt specifically with co-operative marketing, and this aspect is given special attention at Aberystwyth and at Leeds. The Farm Economics Department of the Ontario Agricultural College has investigated the marketing of butter and cheese and tobacco. The Division of Agricultural Economics, Markets and Co-operation in South Africa has investigated the organisation of public markets as well as instituting inquiries into the marketing of some commodities.

Market Conditions.

The investigation of market conditions is a somewhat different problem. It implies a knowledge of the mechanism of marketing of each commodity and a regular

service of information as to supplies coming upon the market and of prices ruling. It also involves a knowledge of consumption. The first of these has already been discussed.

A regular service of market information is a question of statistics rather than of economics, as already discussed, but in marketing even more so than in production there is very marked need for research not merely following upon, but also leading up to statistics. Three stages of research in market conditions may be defined. First, preliminary research into the major factors of supply of each commodity is essential in order to define what items of regular market intelligence are necessary to give a reliable impression of the supply side of the market. Second, since it is clear that, as in the case of production, public general statistics cannot be sufficiently detailed to be used for specific analysis, economic laboratories may find it necessary to collect specific data of their own (over short periods or at intervals) to supplement official statistics. And, third, the work of analysis of market statistics is the province of agricultural economics.

It may be useful to elaborate these points somewhat. In the estimation of supply of farm produce upon the market, national and annual figures have only a limited amount of usefulness. The factors of time and place, in the case of all perishable and semi-perishable products at least, are of vital importance. In other words, the important market feature with regard to most farm commodities is the amount which is likely to be moved into a particular market in each month, week or even day. In the case of fresh vegetables, the case is obvious. With commodities with a large import trade, supply moving to market from abroad, quantities and condition and localisation of product in storage form a background to market supply, but the factors of time and place are still of primary importance. Another aspect which complicates the issue of market statistics is the problem of grades and measures. The almost complete absence of standard measures and standard methods of packing of some products makes the recording of supplies entering the market very difficult. More important still is the recording of the supply of each grade of a commodity. A farm commodity is most often one in name only. It constitutes several often entirely non-competing commodities when quality and condition are brought into consideration.

Every complication of the kind mentioned renders the issue of regular statistics of market supplies more costly, so that the need for preliminary research into the supply side of market conditions is necessary to find out what is the basic market intelligence required for each commodity.

It is virtually impossible that public statistics of markets could give information which would be completely satisfactory for all purposes of analysis of markets. There remains, therefore, the need for the supplementing of official market intelligence by specific investigation from time to time by economic laboratories.

Analysis of Supply.

In the investigation of market conditions, analysis of the collected data is the ultimate function of the agricultural economic research laboratory. The main problem on the supply side of market conditions is the irregularity of supply and the analysis

of the irregularity. Is the irregularity local and how far could it be avoided by a definite organisation between markets for the levelling of supplies? Is the irregularity due to lack of knowledge of the condition of the market on the part of the producer or is it due to his circumstances, such as need of cash, insufficient storage, and so on? Is it due to natural conditions, *e.g.*, summer flush of milk, seasonal egg-laying, and so on, in which cases, in conjunction with scientific investigation, how far is it possible or advisable to control the period? A fourth group of problems centres round the question of alternative markets and the disposal of surplus (the main problem which interests American market economists). Disposal of surplus upon inferior markets is, of course, a vital factor in the problem of market supply. Besides being vital, it requires the most delicate adjustments, for it implies placing the optimum amount upon each of the alternative markets in order to obtain (in the case of a co-operative association especially) the best average price for the whole season's produce.

These are only the main general problems for analysis of the supply side of market conditions. They indicate the need for research, however, and also the complexity of the work, because, again, each commodity has to be treated separately. They constitute a most important foundation of the policy of uniform marketing.

Analysis of Demand.

So far, only the supply side of market conditions has been referred to. It is unnecessary to state that the demand side is equally important. In one sense, indeed, it is much more important that it should receive attention in this memorandum, for it is an aspect of research upon which practically no work has been done.

Analysis of demand has to be approached in somewhat different manner from supply, because the possibility of a statistical service on the movements of demand is very remote. Market statistics give supply and price, price being presumably the reflection of the demand at that time and place upon the given supply. That is probably as far as statistical information is likely to be able to go, in the immediate future at least. It leaves, however, the analysis of market conditions obviously unsatisfactory, for, demand not being constant, it thereby gives a variable of which nothing whatever is known and over which agriculturists have no control (or even prospect of control) as they have of supply. There is, therefore, a very clear field for research into the demand side of the market by agricultural economic laboratories.

In the absence of any other information, the figures for total population of the country or city are regularly used to express demand, by means of figures of "annual consumption per head of population." For certain purposes this is a useful figure, but much more particularised data are required for really effective analysis of demand. One or two lines of possible enquiry might be indicated here, although it is impossible to discuss the subject at all fully.

The amount and the kind of foodstuffs consumed by each head of population is determined mainly by the income of the individual. For the purposes of analysis of demand, it is necessary to distinguish broad classifications of income which correspond to certain more or less typical habits of purchasing. By mapping out

the population in large groups according to income and by studying the effect of the size of income upon the amount and grades of foodstuffs purchased, it should be possible to estimate (more accurately than at present) the effect which changes in the earnings of the various classes would have upon the demand for different products and grades of products.

While the main classification of consumption is according to purchasing power, religious and racial influences cannot be ignored. Local prejudices, too, must be taken into account, and, on the latter point, a subsequent problem arises as to how far these prejudices are removable by advertisement and education.

A second point with regard to demand is the time element. Certain classes of people have uniform and sufficient incomes throughout the year to purchase whatever food supplies they require. In such cases, hot weather, holidays and such like things are the important factors influencing demand. In the case of classes of people whose earnings are weekly and fluctuating, the fact is reflected in demand for grades of products. Similarly, where the earnings are insufficient to cover all necessities, there is a gap in purchasing power near the end of the week which is reflected particularly in commodities like milk. It is an important field of research to see how far these factors can be allowed for ; what is the effect of credit trading in this respect ; what is the effect of the industrial co-operative movement ?

A third aspect of demand analysis is the element of competing commodities. There is probably less competition between first-quality beef and frozen or second-quality beef than between first-quality beef and first-quality mutton. It is almost certain that the main aspects of competition between commodities and grades are functions of the purchasing power of the buyers.

These notes upon research into the demand side of the market are meant merely to be suggestive of the possibilities of this field. The sources of information are so completely non-existent that it is impossible to foresee either all its possibilities or the limit of its usefulness.

Orderly Marketing and Forecasting.

In the interests of orderly marketing, research into market conditions is essential. Orderly marketing does not mean an equal supply. It implies a supply which is adjusted to the fluctuations of demand. Demand cannot be controlled from the agricultural side, so that it must so far as possible be foreseen. Forecasting is essential, therefore, on the demand side of the market. If completely successful regulation of supply existed, forecasting would be confined to the forecasting of demand. On the other hand, since at present supply is never completely regulated, forecasting of supply is also necessary. It is evident that the problems of orderly marketing and forecasting of demand and supply depend upon a thorough investigation of market conditions on the lines indicated in this section. Only a small amount of marketing research of an organised nature has been done on market conditions. The work of the United States Bureau of Agricultural Economics and the wheat studies of the Food Research Institute in California should be specially mentioned,

Prices.

Special interest attaches to the study of prices, because prosperity for the farmer so immediately depends upon the prices he receives. It is doubtful, however, if price studies (if they represent research of real value) are anything more than another name for the marketing research already outlined. There are two distinct aspects of investigation of prices. The one is the question of price spreads between the producer's price and the price the consumer pays. As a research problem, it resolves itself into a study of the marketing mechanism; defining the services of the various units in the machine; endeavouring to measure the cost of their services; comparing the estimated cost with the remuneration actually received; and eliciting opportunities for economy in the working of the machine; all of which, as already stated, is the study of market mechanism.

The other aspect covers the questions of price fluctuations, price stabilisation and price forecasting. Again, as research problems these are simply descriptions of the problems of market conditions and uniform marketing. Prices are a symptom rather than a disease. Like inflammations, headaches and pains, however, they take up most of the attention of the sufferer. Price analysis in marketing (like the study of symptoms in disease) is exceedingly important, but the value of the analysis is in direct proportion to the amount of knowledge of the structure of markets and of the market conditions of demand and supply. The very real and useful interest, therefore, which is displayed in the question of price studies, far from being deprecated, requires to be directed to the more fundamental working of the marketing machine and to the factors controlling market conditions.

VII.—CO-OPERATION.

FARMERS' co-operative marketing associations are a part of the marketing system, and as such come within the scope of the marketing section of agricultural economics. There are wider aspects of co-operation, however, besides marketing associations, such as the purchasing associations, credit societies, insurance and general improvement societies, all of which have a bearing upon agricultural economics. The general principle, too, of co-operation, as a united effort of farmers in the direction of improving their own conditions, in itself constitutes a claim to special consideration.

The main aims of co-operation among farmers in marketing are to secure economy of marketing with the best results to producer and consumer by (1) abolition of the waste of overlapping where a large number of agencies are handling the product; (2) the elimination of excessive margins of profit by middlemen; (3) grading and standardisation; and (4) orderly marketing for the purpose of levelling fluctuations of prices. In all of these objects, success depends upon the adequacy of the knowledge of economic conditions at each stage of marketing, knowledge which, it has already been suggested, it is the work of agricultural economic laboratories to furnish.

In addition to the help which agricultural economists can give to agricultural co-operation by the study of the trade in which they operate, there are internal problems of organisation and management of the associations which economists in

some countries are trying to solve. The principle of co-operation is a simple one, but in practice it can be embodied in a great variety of forms. Each commodity involves special study as to the structure of its selling associations. Single commodity marketing, the limits of expansion, contracts, internal government, finance, liability, systems of payment ; all of these are internal economic problems in the solution of which agricultural economists can assist. In the United States of America and in South Africa, extensive services (not strictly economic research) are rendered by the agricultural economic departments to the farmers' co-operatives in the way of registration, inspection, legal advice and accountancy. Reference might also be made to the work of the Horace Plunkett Foundation in London in advising on co-operative organisation in the Empire and acting as a clearing-house of information.

VIII.—OTHER BRANCHES OF RESEARCH.

By a broad definition of the two terms production and marketing, almost every aspect of agricultural economics may be viewed as belonging to one or other of these two phases.

There are, however, several subjects of research in agricultural economics which may be described as general. These subjects consist for the most part of studies of the agricultural aspects of certain general economic problems.

The importance of these will be readily grasped by merely mentioning some of them : transport, credit, monetary policy, taxation, insurance, history of agriculture (descriptive and statistical), the whole field of what is called in America rural sociology (involving questions of population, housing, standard of living, community or social life, and education), the general group described as land economics (including natural resources and utilisation, reclamation and settlement, tenure, rents and land values). A certain amount of study is also necessary with regard to publicity of results of research. These constitute a wide and important field for research.

IX.—APPLICATION OF RESEARCH.

It has been the intention of the preceding sections not to suggest concrete schemes of research, but to indicate the principal phases of the subject-matter of agricultural economics—phases which have as their ultimate aim more efficient production and more efficient marketing. The whole plan of research, however, has to be built up bit by bit by a series of particular investigations, each of which has an immediate purpose. Farm management research, by analysing the individual farm or by analysing the general conditions of many farms of the same kind, can point to concrete improvements in farm organisation. Marketing research, by improving the mechanism of marketing, can reduce the spread of prices between the farmer and the consumer to the advantage, it is hoped, of the farmer. Actual economies of the kind are the first purposes of agricultural economic research. In addition, however, to the immediate local purposes of eliminating the minor inefficiencies of the industry, agricultural economic research aims at building up a knowledge of the wider economic

forces, which are controlling world production and world markets, in order that it may guide the more fundamental policies underlying individual and national systems of farming.

In centuries when production and distribution were less complex than they are to-day, the individual farmer had within his personal observation all the facts he required concerning his occupation. He was able to focus them for himself and to form his own estimate of the future. It is hardly possible to-day for any individual (even a full-time research worker, let alone a farmer) to study, at one time, the whole of the world conditions which influence the farming industry. The work has to be done by definitely organised effort and the results placed at the disposal of farmers, individually or collectively. The more complete and intricate the knowledge of the factors governing each part of the agricultural industry becomes, the more difficult it is for the farmer to make his own estimate of the future. The concentration of research seems, therefore, to tend inevitably towards the economic laboratories themselves forecasting future conditions.

It is almost impossible to exaggerate the far-reaching power of forecasting. The Outlook Report of the U.S. Bureau of Agricultural Economics is the first attempt of its kind on so large a scale. It aims at presenting, in the spring of each year, the conditions of six months, or a year or more, ahead, and its purpose is to enable farmers to frame their season's policy.

Forecasting has, however, a deeper significance than annual tipstering. Readjustment studies have been tentatively undertaken in various countries in what have been called "sick areas," namely, areas where the existing system of farming had ceased to be profitable. The problem of the readjustment studies is to survey conditions and advise the farmers how to readjust their system more quickly to the changed conditions than they otherwise would. These studies are likely to prove among the most materially profitable of all the projects of agricultural economic research. At a still later stage of development, agricultural economics may be able to advance, like medical science, from the diagnosis and healing of "sickness" to the promotion of health.

This further step is theoretically not impossible, given access to all the necessary data. It involves three main factors: (1) the ability to forecast over-production of a commodity; (2) the ability to isolate the areas which are less favourably situated for the production of the commodity (*i.e.*, the marginal areas); and (3) the ability to propose an effective system to substitute in these areas. By readjusting the system of farming of the less favourably-situated areas in accordance with the forecast (instead of waiting until the over-production is an accomplished fact), some of the over-production and its consequent losses to all producers would be prevented. The paradox of forecasting economic conditions is that the more authoritative and accurate the forecast and the more confidence it inspires, the less likely it is to be fulfilled.

There is thus no difficulty in looking into the future and finding infinite possibilities of the power of agricultural economics to guide agricultural destinies. The power of the subject in the future, however, will depend upon the years of field-work and upon the patient analysis of local conditions. On the other hand, it cannot be

too often reiterated that the local researches must be built up together in order to develop the full value of agricultural economics in promoting the prosperity of the farming industry.

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SUMMARY OF REPORT AND RECOMMENDATIONS.

(I) INTRODUCTORY.

THE Committee welcome the inclusion of agricultural economics among the branches of agricultural research to be discussed at the Imperial Agricultural Research Conference, and recommend that a comprehensive survey should be made of the work undertaken in various parts of the Empire and in foreign countries.

(II) DESCRIPTIVE.

Starting from the comparatively constant features of land tenure, climate, geographical conditions and the general organisation of farms, the track of agricultural economic research leads, through the first operations in the production of farm commodities, right to the passing of the commodities into the hands of the consumer. It is the charting of this track and the provision of posts and warnings that is the work of agricultural economic research. Research has been conducted :— (i) By individual observers ; (ii) by Government Commissions or Committees of Enquiry ; and (iii) by research workers in the field of applied natural science.

Recent developments have been :—(i) Development of a recognised technique ; (ii) continuity of observation ; and (iii) organisation of research in “economic laboratories.”

The United States and certain Continental countries have been conducting research in agricultural economics for a number of years. The U.S. Bureau of Agricultural Economics alone had an appropriation of about £950,000 in 1925–26.

The study of agricultural economics in the Empire is still relatively undeveloped.

In the United Kingdom the Agricultural Economics Research Institute at Oxford has been in existence since 1913. Since the war, Advisory Agricultural Economists have been appointed, under the Ministry of Agriculture's scheme, at Cambridge, Leeds, Aberystwyth, and eight other centres. The Ministry of Agriculture has established an Economics Division and a Marketing and Co-operation Branch. There is no Chair of Agricultural Economics in any University in Great Britain.

In Canada, agricultural economics has attained an important place in the agricultural education system. Research has been conducted in Ontario and in the University of British Columbia. The Dominion Government of Canada, through its experimental stations, has carried out some economic research.

In South Africa, a Division of Agricultural Economics, Marketing and Co-operation, was established in 1925 in the Department of Agriculture.

In 1925 the New Zealand Government created a Branch of Farm Economics in connection with the Fields Division of the Department of Agriculture.

In 1924 the Department of Lands and Agriculture in the Irish Free State initiated a scheme of costings investigation.

In Australia, a few cost of production studies in experimental areas have been made although no department has yet been organised for the specific purpose of research in agricultural economics. The recently-established Development and

Migration Commission is undertaking an economic survey of the resources of Tasmania.

In India, the evidence to the Royal Commission on Indian Agriculture and the recommendations of the Indian Economic Inquiry Committee of 1925 show a growing interest in agricultural economics.

The Imperial College of Tropical Agriculture, Trinidad, includes agricultural economics in its course of study.

(III) STATISTICS.

The statistics used in agricultural economics fall into two classes :—

- (i) Those which are collected for specific purposes, as by cost accounting or by surveys ; and
- (ii) those which are collected and published by public authorities for general purposes, *e.g.*, statistics of acreage, prices, imports, etc.

Development in the collection and publication of public statistics is of fundamental importance in agricultural economics, and the Committee suggest that joint discussion between statisticians and economists is desirable.

Particular importance attaches to the projected World Agricultural Census of 1930. Many parts of the Colonial Empire have never carried out an agricultural census, and it is important to the Empire as a whole that this deficiency should, where possible, be remedied. The Committee therefore recommend that the attention of the Governments of the Empire should be drawn to the need of co-operating to the fullest possible extent in the project of a World Agricultural Census in 1930.

(IV) AGRICULTURAL GEOGRAPHY.

The report emphasises the need for development in the economic geography of agriculture. Geographical considerations govern the comparative advantages and disadvantages of different producing areas, and provide guidance as to the limitations and possibilities of expansion. The value of national agricultural geography is even more pronounced, since geographical conditions are bound to bulk largely in problems of readjustment.

The Committee recommend that the preparation of Agricultural Atlases should receive special attention from the Governments of the Empire.

(V) FARM MANAGEMENT.

Farm management is the central point in the study of production. The two principal methods of research are :—(i) Cost accounting ; and (ii) the survey method.

The technique of agricultural cost accounting has been specially developed at the Agricultural Economics Research Institute, Oxford, and a uniform system has

been adopted in principle throughout England and Wales. American and Continental systems differ in several important respects from the English system. Recent developments have tended towards the use of the survey method, as a more extensive and fruitful means of enquiry.

The Committee desire to emphasise the value both of costings investigation and of farm surveys in the development of Empire agriculture, and suggest that there is scope for useful co-operation between different parts of the Empire in this field.

(VI) MARKETING.

A distinction is drawn between (i) research in the mechanism of marketing and (ii) research into market conditions of supply and demand.

Special interest attaches to the study of prices, because prosperity for the farmer so immediately depends upon the prices he receives. The study of prices, however, requires to be supplemented by more fundamental research into the working of the marketing machine and into the factors controlling market conditions. Possibilities of future development are indicated under the headings of Analysis of Supply, Analysis of Demand, Orderly Marketing and Forecasting.

The field thus opened up is enormous, and development must necessarily be slow. The Imperial Economic Committee and the Empire Marketing Board have made considerable progress, and the Committee recommend that every effort should be made to develop organised marketing research and market intelligence in the interests of Empire agriculture.

(VII) CO-OPERATION.

Producers' co-operation has a special claim on the attention of agricultural economists. The main aims of co-operative marketing are :—

- (i) Abolition of waste through multiplicity of agencies ;
- (ii) Elimination of excessive margins of profit by middlemen ;
- (iii) Grading and standardisation ; and
- (iv) Orderly marketing for the purpose of levelling fluctuations of prices.

Extensive services can be rendered to the co-operative movement by Agricultural Economic Departments, and the work of the Horace Plunkett Foundation deserves special mention.

(VIII) OTHER BRANCHES OF RESEARCH.

Research in agricultural economics also covers the study of the agricultural aspects of certain general economic problems such as transport, credit, monetary policy, taxation, insurance, rural sociology and land economics.

The question of securing publicity for the results of research is a problem to which the Committee attach great importance.

(IX) APPLICATION OF RESEARCH.

Farm management studies should point to the possibility of economies and improvements, and marketing research should contribute to a reduction in the spread of prices between producer and consumer.

In addition, agricultural economic research aims at building up a knowledge of the wider economic forces controlling world production and world markets, as a guide to the more fundamental policies underlying individual and national systems of farming.

Looking to the future, agricultural economics aims at advancing, like medical science, from diagnosis to healing, and from the healing of sickness to the promotion of health. But the possibilities of the subject in the future depend upon the years of field work and upon the patient analysis of local conditions ; and the local researches must be built up together in order to develop the full value of agricultural economics in promoting the prosperity of Empire agriculture.

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